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| RESEARCH ARTICLE

Interpretation of sentiments by popular machine models: A study with Saudi student-interpreters

Alshaymaa Yahya Alharbi
Assistant professor of Translation, Applied College, Taibah University, Madinah-Saudi Arabia
Corresponding Author: Alshaymaa Yahya Alharbi, **E-mail**: AHEMEDE@taibahu.edu.sa

| ABSTRACT

This mixed-methods study explores which of the four free AI applications, Google Translate, Microsoft Translator, Microsoft Bing AI, and QuillBot, are most successful in decoding emotional messages in the Arabic-English language pair. A dataset of positive, negative, neutral, and mixed emotional tones was used for interpretation test with the AI programs, and results were rated by three language experts for sentiment accuracy, contextual understanding, and cultural appropriateness. Findings revealed that AI tools are quite effective in recognizing obvious positive and negative emotions but experience some issues when it comes to ambiguous or culturally specific speech content. Microsoft Bing AI showed the least difference with human judgments and hence found to be the best for Arabic-English emotive interpretation. The results indicate that AI can serve as a resource for Saudi student-interpreters and confirm the importance of human-AI cooperation to obtain the correct context-specific and culturally sensitive interpretation.

| KEYWORDS

AI, curriculum, interpretation, Saudi students, translation

| ARTICLE INFORMATION

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1. Introduction

Interpretation is at a crossroads in contemporary world as it struggles to find balance between traditional language skills, global communication, and technological advancements (Horváth, 2022). Though interpretation has facilitated interlingual communication for a long time, geopolitical dynamics and shrinking borders have given it an impetus like never before. Nevertheless, human interpreters stand the risk of being phased out with the expanding outreach of AI as the latter can address diverse and vast user needs (Mahdi & Sahari, 2024). Studies have noted the possible elimination of interpreters by AI tools in related occupations (Al-Wasy & Mohammed, 2024). One of the biggest challenges for interpreters is balancing information processing with notetaking as the process often results in errors or inaccuracies during reformulation. Cognitive effort is also heightened during comprehension phase, underscoring the necessity of notetaking (Zou & Guo, 2024). Unlike interpretation, translation covers wider communication as it facilitates intercultural exchange. One instance of this is the translation of classical Arabic poetry into English which significantly brought to the world some fundamental aspects of Arab cultural legacy (Farghal & Haider, 2024; Alowedi & Al Ahdal, 2023). Translation differs from interpretation in another sense: it involves not only relaying the original message in the target language but also offering a natural equivalent to make for cultural differences and language nuances. Since human translation has limitations especially in terms of expertise across different language pairs, AI tools step in as they firmly tread the path to achieving greater script similarity, pronunciation perfection, and semantic similarity between languages, a continuous process of enrichment with every single hit by users (Boudaa et al., 2024). This implies that distinctive linguistic features might be alien to AI tool(s) and cause erroneous interpretation since interpretation is a real-time process, a type of speech production, spontaneous, and embellished with paralanguage and prosodic features that are matched by the human

interpreters to produce good versions which has not yet been achieved by AI powered tools. Finally, and most importantly, the ethical issues concerning user discretion, confidentiality, impartiality, and complete precision can be violated in AI-based tools by virtue of the fact that they are operated by machines that are not competent to answer to these calls.

1.1 Objective of the research

AI tools come with many features that can be great for contexts that are dependent on user inputs, virtual, and augmented reality. However, even software developing companies do not claim to have developed tools capable of identifying emotions of speakers and/ or producing suitable responses to these despite using complex, large datasets. Humans, on the other hand, are likely to be more sensitized to these needs and therefore, better than their machine counterparts in interpretation. In this background, the current research assesses the potential of four popular and highly used AI tools (Google Translate, Microsoft Translator, Microsoft Bing AI, and QuillBot) to identify their efficacy to interpret sentiments across speech genre, determine the most viable tool in the Arabic-English language pair, and examine the perceptions of Saudi interpreters to utilize AI tools in instant interpretation.

1.2 Research questions

Based on the hypothesis underlined in the objectives, this research aims to answer the following questions:

1. How do professional Saudi student-interpreters perceive the application of AI tools in emotion interpretation in comparison to human contributions?
2. To what extent do the four AI applications in this study excel in interpreting a set of emotive speech samples?
3. Out of the four tools included in this study, which most closely and accurately interpreted emotive speech data?
4. How do AI tools refer to the practical activities of the novice Saudi translators?

1.3 Significance of the study

AI translation tools learn from user input, but users rarely appreciate that data confidentiality issues have not been fully explored in the context of AI. Instead, today, non-technical users blindly trust computer software as smarter than the human mind given its processing speed and ability to process from previously saved data and interactions. Each time a user inputs data for a task like translation using software like Google Translate, Microsoft Translator, Microsoft Bing AI, and QuillBot, the AI processes huge data to generate output. Despite issues of secrecy and confidentiality of data, translation classrooms around the globe are increasingly adopting an open-doors policy to AI as a facilitator in the learning process. Integration of AI into the classrooms is a reality in the Saudi context too as it aligns with the state's education policy that stipulates integration of technology in the education sector to prepare learners for the global tech revolution.

2. Literature review

Teaching, learning, and processing of the Arabic language are fast-evolving processes due to the inroads being made by AI into them. AI-based platforms in language learning are becoming commonplace as they offer individualized and responsive learning that addresses the needs of Arabic learners (Al-Shaboul et al., 2025). At the same time, the field of translation has been altered by machine translation that utilizes AI for text translation in a manner close to human-like mental processing. Nonetheless, the process of translating texts is a complicated one and is associated with many major challenges the biggest of which is the need for the translator to consider cultural peculiarities, grasp information about the target language setting, as well as other factors related to the genre of writing and expectations of the target audience. Besides, there persists the need for distinction between translation methods and translation procedures: the former is applied to whole texts whereas the latter is applied to sentences (or other unitary linguistic units) (Rumman & Al Salem, 2023).

AI continues to gain relevance in language processing as digital technologies are making an impact in virtually all spheres of contemporary life (Shormani & Al-Sohbani, 2025). Neural machine translation has great potential for breaking challenging language obstacles. Nevertheless, language pairs with structural and script differences come with their unique set of problems, one such pair being Arabic-English. A major drawback of MT is that it fails to translate sentences in a context, caring little about discourse and contextual clues (Majumder et al., 2022; Mahdy et al., 2020; Alqahtani & Al-Ahdal, 2025a). This shortcoming limits the efficacy of free AI tools in generating contextually robust translations. The market of translation services is still dispersed, and the popularity of a free program such as Google Translate is due to its speed, (zero) cost, and convenience more than the quality of translation (Al-Khalifa et al., 2024). Studies have focused on other drawbacks also of machine translation (Falempin & Ranadireksa, 2024).

Advances in educational technology have highlighted the disparities between AI-based MT and human translations. Although speed, cost, and accessibility benefits of the use of MT are appealing, its competence as compared to human translation is a controversial subject. Machine translation is highly dependent on databases, glossaries, and online materials, a situation in which lack of authoritative sources can affect quality. Some linguistic issues are also still hard to solve through AI. Slangs and other nuanced terms commonly do not have direct translations in the target language which makes them difficult to translate (Hashish & Hussein, 2022; Alqahtani & Al-Ahdal, 2025b; Noman et al., 2025). Similarly, Obeidat et al. (2024) analyzed AI and MT of 155 English idioms into Arabic, comparing the literal versus sense-based and idiom-to-idiom approach, highlighting the weakness of MT in addressing nonliteral speech. These studies thus indicate the significance of context, cultural learning, and human control in producing correct translations. However, research on the effectiveness of free AI applications in decoding emotive language between Arabic-English speech data, and the attitude of the Saudi Arabian student-translators towards its use is almost negligent. Due to this, a specific discrepancy exists in determining the level of accuracy of AI technologies in understanding sentiment and the readiness of Saudi student-translators to utilize AI in interpretation.

3. Methodology

The mixed-method framework in this study combines text sentiment analysis with four AI tools, emotion analysis by AI, expert analysis, and a comparative analysis to evaluate accuracy, reliability, and human-AI interaction in the work of Saudi student-translators.

3.1 Research design

This study used a mixed research design to examine the impact of AI in sentiment analysis on student-translators at Taibah University in Saudi Arabia. The qualitative data comes from four AI programs used for interpretation of emotive text samples between the Arabic-English language pair. All output was rated by three language experts for accuracy, contextualism, and cultural appropriateness the consistency of which was ensured by the measure of inter-rater reliability. An online survey was taken by three professional interpreters across Saudi Arabia to gather information about their views, attitudes, and readiness to use AI in real-time interpretation. This research brings in multiple approaches to compare the effectiveness of AI applications with that of humans and to also explore the human perspective on the use of AI in interpretation, these inputs can enrich the translation-interpretation and training curricula in KSA.

3.2 Data preparation

The research uses the Arabic–English parallel sentence dataset available on Kaggle (https://www.kaggle.com/datasets/waseemalastal/arabic-english-dataset) which is derived from the Tatoeba Project's sentences_detailed.csv file and is available through ManyThings.org. As of April 1, 2024, the dataset has English sentences and their Arabic translations next to each other with a tab separating them. It also includes information about who contributed to the dataset and how it can be used. It is available under the Creative Commons Attribution 2.0 license which means that authors must get credit for their work. The dataset can be used for activities like learning a language, translating text using machines, and doing linguistic research. Even though native speakers write most of the sentences and proofread them, there can remain a few incongruencies because of errors possibly made by users or contributors.

Table 1 outlines the roles of the three language raters in the study. Their high competence in translation and linguistics, especially in Arabic-English, and their assigned duties, which are sentiment accuracy, contextual meaning, linguistic correctness, and cultural understanding, ensured reliability of the assessment process and enabled calculating inter-rater consistency to accurately compare the outputs of the AI tools in this study.

Table 1: Rater roles

Rater ID	Expertise	Language Proficiency	Role in Study
Rater 1	Translation / Interpretation	Arabic-English	Sentiment accuracy & contextual meaning
Rater 2	Linguistics / Translation	Arabic-English	Linguistic correctness & cultural interpretation
Rater 3	Translation / Interpretation	Arabic-English	Overall evaluation of AI outputs

3.3 AI tool selection

The study used four free translation applications viz., Google Translate, Microsoft Translator, Microsoft Bing, and QuillBot to determine their effectiveness in Arabic versus English sentiment analysis. These applications processed the Arabic-English linguistic material to interpret the original Arabic speech. These results were then examined to determine whether the emotion expressed by the text data was accurately reflected in the translated version. Subsequently the same were evaluated and compared by language experts to determine the accuracy and reliability of the four AI applications when decoding sentiments from Arabic speech.

All the data was in Arabic and English translations were offered on demand to ensure cross-language sentiment analysis. Table 2 outlines the selected AI applications, their classification, supported input/output formats, and availability in Saudi Arabia.

Table 2: AI tools sampling

AI Tool	Category	Primary Function	Input Format	Output Format	Role in Study	Accessibility
Google Translate	Neural Machine Translation (NMT)	Automatic text and speech translation	Arabic Text / Speech	English Text	Sentiment interpretation through translation	Free, online (accessible in Saudi Arabia)
Microsoft Translator	AI-based Translation	Multilingual translation and language processing		English Text	Evaluating translation accuracy and emotional tone	
Microsoft Copilot (Bing AI)	AI Chat / Language Interpretation	Context-aware translation and explanation		English Text with contextual explanation	Assessing contextual sentiment understanding	
QuillBot Translator	AI Translation / Paraphrasing	Translation with paraphrasing capability	Arabic Text	English Text	Evaluating fluency and sentiment preservation	

3.4 AI-driven sentiment analysis

The text samples that were gathered in the Arabic-English Dataset were translated simultaneously by Google Translate, Microsoft Translator, Microsoft Bing, and QuillBot. The resulting outputs was analyzed to determine the accuracy and quality of the sentiment or emotion translated by them and whether the intended effect could be classified as positive, negative, or neutral sentiment.

3.5 Experts' evaluation

Three language experts reviewed the quality of the AI-generated output as per the following:

Step 1: Selection of evaluators

Three academics proficient in Arabic and English assessed the AI interpretations. These professionals were translators, linguists, and experienced interpreters.

Step 2: Assessment procedure

The three experts evaluated the outcomes of the AI programs using standard parameters. The first was sentiment accuracy that refers to the capabilities of the AI to identify the tone of the text in a particular segment with high precision. The next parameter was contextual meaning used to determine whether the discourse had the same meaning as the original discourse. The last parameter was linguistic accuracy in terms of grammatical correctness and clarity of expression in English. Finally, the evaluators checked cultural interpretation, i.e., whether the translation captured cultural elements of the Arabic discourse.

Step 3: Inter-rater reliability

Inter-rater reliability was calculated to determine the level of consensus between the raters. The degree of consistency between assessors indicates accuracy of results and consistency of assessment of the performance of AI applications.

3.6 Data Analysis

3.6.1 Qualitative analysis

The outcomes of the four AI programs were compared to the source Arabic text and reviewed by language experts for accuracy of translated sentiment, contextual meaning, grammatical accuracy, and cultural appropriacy. Thematic analysis identified the AI programs' efficacy, similarities, strengths, and weaknesses in capturing the subtle emotions in the source Arabic text.

3.6.2 Quantitative analysis

- Survey data: A questionnaire was used to gather the perceptions of the participants towards AI tools and the responses were subjected to descriptive tools to determine the trends.
- Inter-rater reliability measures: Cohen's kappa or intraclass correlation were computed to evaluate the consistency of experts' ratings and qualitative data.
- Comparison of AI tools: Accuracy, contextual understanding, and sentiment analysis of output of each of the four AI tools were carried out.

4. Result

4.1 AI translation outputs

Table 3 below summarizes how the four AI programs in the study converted Arabic speakers' positive, negative, neutral, and mixed emotional states into English.

Table 3: Arabic-to-English interpretations by AI tools

Arabic Text	Sentiment	Google Translate	Microsoft Translator	Microsoft Bing AI	QuillBot Translator
مرحباً! أناسعيدلرؤيتك اليوم	Positive	Hello! I am happy to see you today.	Hello! I am glad to see you today.	Hello! I am delighted to see you today.	Hello! I am happy to see you today
أشعربالغضبب سببهذاالقرار	Negative	I feel angry because of this decision	I am angry about this decision	I feel frustrated about this decision	I feel angry about this decision
أعتقدأنالأمورل يستجيدة، ولكنربماتتحس ن	Mixed	I think things are not good, but maybe they will improve	I believe things are not going well, but may improve	Things seem bad, but there is hope for improvement	I think things aren't good, but maybe they will get better
اليومكانيومآعا ديآلاشيءمميز	Neutral	Today was an ordinary day, nothing special	Today was a normal day, nothing special	It was an ordinary day today, nothing special	Today was an ordinary day, nothing special

The comparative analysis indicates that all AI tools effectively interpreted content with clear positive and negative sentiments. However, variations appeared when interpreting nuanced or mixed emotions. Data indicates that Microsoft Bing AI demonstrates stronger contextual awareness and produces more sentiment-sensitive content, while QuillBot prioritizes fluency, occasionally simplifying complex emotional tones. Google Translate and Microsoft Translator provide generally accurate translations but tend

to remain more literal. Overall, mixed or context-dependent sentiments remain challenging for all tools, highlighting their limitations in capturing subtle emotional nuances in Arabic–English AI translation.

4.2 Experts' evaluation of AI outputs

Three language experts reviewed the translations for sentiment accuracy, contextual meaning, linguistic correctness, and cultural interpretation. Table 4 summarizes their comments.

Table 4: Expert reviewers' comments on AI tools' output

AI Tool	Reviewer 1 Comments	Reviewer 2 Comments	Reviewer 3 Comments	Overall Observations
Google Translate	Accurate for clear sentiments; struggles with mixed emotions	Fluency is good; misses subtle context	Adequate but literal; idioms simplified	Good for simple lines, mixed emotions need human oversight
Microsoft Translator	Handles common phrases well; mixed sentiments are less accurate	Context captured better than Google	Slightly awkward phrasing in long sentences	Reliable for positive/negative, moderate for mixed sentiments
Microsoft Bing AI	Best contextual understanding; nuanced translation	Captures subtle emotions and expressions	Fluent and context-aware	Most accurate for sentiment interpretation; aligns closely with human judgment.
QuillBot Translator	Smooth and readable	Simplifies negative/mixed sentiments	Accurate for neutral/positive, lacks nuance	Prioritizes fluency over accuracy; mixed emotions are often misclassified

4.3 Quantitative evaluation of AI tool performance

Table 5 shows quantitative assessments of how well the four AI-driven translation programs (Google Translate, Microsoft Translator, Microsoft Copilot, and QuillBot) interpreted sentiment from Arabic to English. Key performance metrics in the study were sentiment accuracy, contextual preservation, linguistic fluency, and sentiment consistency. Microsoft Copilot (Bing AI) gave the best output among the four across all metrics, and with much higher accuracy than the others ($F = 6.42$; $p < 0.01$). Strong positive correlations between AI-generated outputs and expert ratings indicate the ability of these programs ($\rho = 0.68$ to 0.75; $p < 0.001$).

Table 5: Comparative statistical analysis of AI-assisted sentiment interpretation

Analysis Domain	Variable / Measure	Statistical Method	Google Translate	Microsoft Translator	Microsoft Copilot (Bing AI)	QuillBot Translator	Interpretation / Metrics
AI Tool Performance	Overall Sentiment Accuracy (%)	Comparison with expert baseline	82.5%	79.8%	85.2%	80.7%	Copilot performs best; significant differences ($F = 6.42$, $p < 0.01$)
	Contextual Preservation (%)	Expert-validated scoring	78.4%	75.1%	82.6%	77.3%	Copilot maintains context most accurately.
	Linguistic Fluency (%)	Expert evaluation	80.1%	78.6%	84.0%	79.2%	Copilot has the highest fluency; others are comparable.

	Sentiment Consistency (Positive/Negative/Neutral)	Percentage agreement	81.0%	77.5%	86.3%	79.0%	Consistency aligned with sentiment labels
Correlation Analysis	AI output vs Expert Ratings	Spearman's ρ	ρ = 0.71, p < 0.001	ρ = 0.68, p < 0.001	ρ = 0.75, p < 0.001	ρ = 0.69, p < 0.001	Strong positive correlation → AI predictions align with human judgment

Note: $p < 0.05$ – statistically significant, $p < 0.01$ – highly significant, and $p \geq 0.05$ – not significant (NS)

Figure 2 compares the performance of each program for the four key areas (accuracy, contextual preservation, linguistic fluency, and sentiment consistency). Microsoft Copilot (as Bing AI) outperformed all other technologies on all performance parameters, demonstrating an ability to correctly interpret sentiment (85.2 %), maintain context (82.6%), produce fluent output (84.0 %), and consistently interpret sentiment (86.3 %).

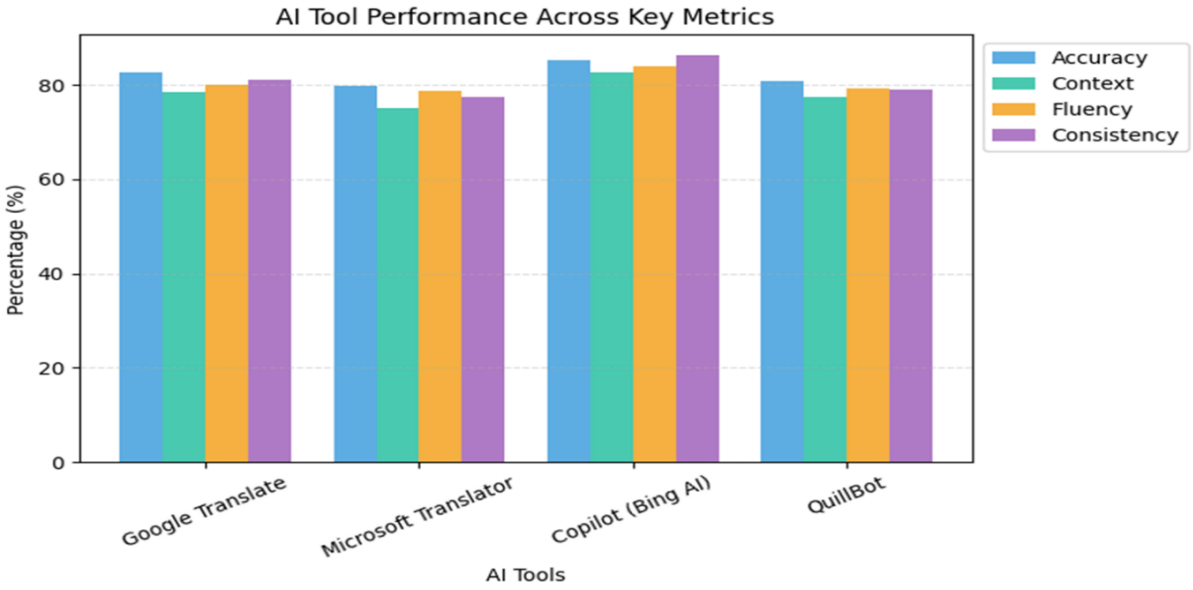

Figure 2: Performance evaluation of AI tools

5. Discussion

The study answered the research questions by triangulating data based on the efficiency of AI tools to interpret emotive content, and the views of Saudi student-interpreters. The results show that in Saudi Arabia, student-interpreters consider AI technologies a helpful means of immediate interpretation, especially of simple material, but are relatively cautious when it comes to using AI to translate culturally sensitive or challenging texts, which also aligns with the findings of Al-Khalifa et al. (2024). Regarding sentiment decoding, AI applications are efficient in recognizing clearly positive or negative sentiments, but ambivalent and culture-specific expressions are not easy to detect because of the sentence-level analysis required to do so (Majumder et al., 2022). In the comparison of the reviewed tools, Microsoft Bing AI output was rated the best by the language experts on contextual sentiment understanding and interpretation. Results hence indicate that AI technologies can assist Saudi student-translators by enhancing the efficiency of translation and producing preliminary drafts. Nonetheless, human review would still be needed to provide accuracy of context and cultural suitability, and it is crucial to outline that AI and human experience would be complementary to translation practice and training.

6.Conclusion

The efficacy of AI programs for Arabic-English sentiment analysis was evaluated based on success of four AI programs in interpreting emotive content. Samples of Arabic texts were transformed using a mixed-method approach with four AI programs:

Google Translate, Microsoft Translator, Microsoft Bing AI, and QuillBot, and then evaluated by three language experts. The study concluded that AI technologies are effective in dealing with positive and negative attitudes, but not so when dealing with mixed and culturally nuanced expressions.

7. Recommendations

Further research should include larger and more diverse datasets, consider the use of more advanced context-based AI tools/ programs, and conduct research around the possibility of developing hybrid approaches that combine both human and AI in the training of student-translators.

8. Limitations

Limitations of this study include the small dataset, focus on one language pair, and inclusion of only free translation programs.

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